

# Adam Aurisano

## Curriculum Vitae

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### Affiliation:

University of Cincinnati  
Department of Physics  
PO Box 210011  
Cincinnati, OH 45221-0011

### Present location:

NO $\nu$ A and MINOS+ Experiments  
Fermi National Accelerator Laboratory  
P.O. Box 500, MS 220  
Batavia, IL 60510-5011

## CURRENT POSITION

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### Post-doctoral Fellow

Department of Physics, University of Cincinnati  
Supervisor: Professor Alexandre Sousa

## EDUCATION

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**Ph.D.**, Physics, Texas A&M University, College Station, TX December 2012  
*Experimental Particle Physics*

Thesis Topic: "Search for New Physics in the Exclusive Delayed  $\gamma + \cancel{E}_T$  Channel in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV"

Advisor: Professor David Toback

**M.S.**, Physics, Texas A&M University, College Station, TX 2007  
*Experimental Particle Physics*

Masters Project: "Signals in the Co-annihilation Region of Supersymmetry at the LHC - Supersymmetry and Dark Matter"

Advisor: Professor David Toback

**A.B.**, Physics, University of Chicago, Chicago, IL 2004

**S.B.**, Mathematics, University of Chicago, Chicago, IL 2004

## POSITIONS

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**Visiting Post-doctoral Fellow** May 2014 - August 2014

Department of Physics, Harvard University  
Supervisor: Professor Gary Feldman

**Post-doctoral Fellow** 2012 - present

Department of Physics, University of Cincinnati  
Supervisor: Professor Alexandre Sousa

**Graduate Research Assistant** 2004 - 2012

Department of Physics, Texas A&M University  
Supervisor: Professor David Toback



**Undergraduate Research Assistant**

2002 - 2004

Department of Physics, University of Chicago  
Supervisor: Professor Frank Merritt

**Undergraduate Research Assistant**

2001 - 2002

Department of Physics, Texas A&M University  
Supervisor: Professor Henry Frisch

**RESEARCH EXPERIENCE**

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**NO $\nu$ A Collaboration, University of Cincinnati**

2012-present

- Member of the simulation group. Responsible for improving the front-end simulation.
  - Developed an improved photon transport algorithm that takes into account light loss near the end of cells and the distribution of scintillation light capture in time and along the fiber.
  - Studied front-end noise using long pedestal scans taken on hardware installed on a test stand to disentangle noise from cosmic ray induced signals seen in pedestal scans taken on the detectors. Used these scans to create an improved noise simulation that takes into account large correlations in time.
  - Developed methods to tune the noise, photon transport, and readout simulations to improve agreement between data and Monte Carlo.
- Member of the production group. Responsible for migrating NO $\nu$ A to a production system built around the SAMWeb data handling system.
  - Developed methods to store metadata in NO $\nu$ A files.
  - Pioneered the use of SAMWeb to create self-draining datasets for automating the daily processing of data.
  - Created a python wrapper script to facilitate the construction of production jobs that properly transfer metadata between subsequent stages of file processing.

**MINOS/MINOS+ Collaboration, University of Cincinnati**

2012-present

- Co-convenor of the calibration group (October 2013-present)
  - Directed the validation of a new reconstruction release needed to handle the increased intensity of the MINOS+ era.
  - Coordinated the calibration and the assignment of systematic uncertainties for the first data of the MINOS+ era.
  - Guided improvements to the model of light attenuation along scintillator strips.
  - Leading the cooperation between the MINER $\nu$ A and MINOS calibration group to prepare MINER $\nu$ A for the eventual shutdown of MINOS+.
- Member of the internal review committee for the paper presenting a detailed description of the  $\nu_{\mu}$  disappearance measurement performed with the full MINOS dataset.
- Member of the reconstruction group. Focused on improving efficiency of reconstruction software. Used standard library algorithms to reduce the complexity of track fitting code from quadratic to linear complexity. This helped make track fitting in the increased intensity of the near detector at MINOS+ possible.
- Member of the sterile neutrino analysis group.
  - Validated new reconstruction software using the disappearance analysis framework.
  - Combined MINOS and Bugey sterile neutrino limits to create a limit directly comparable with short-baseline appearance experiments.
  - Constructed systematic uncertainties for use in the MINOS sterile neutrino search.



- Pioneered the use of the  $CL_S$  method at MINOS to determine the sterile neutrino sensitivity and limit.
- Found inefficiencies in the generation of oscillated predictions that produced at 3x speed-up of the sterile fitting code.

CDF Collaboration, Texas A&M University

2007-2012

- Searched for new physics in the exclusive delayed  $\gamma + \cancel{E}_T$  channel.
- Studied the effect of electrons being reconstructed as photons on calorimeter timing.
- Developed a method for calibrating track times.
- Regularly updated calibration constants for the EMTiming system.
- Maintained and upgraded *ObjectMon*, a Run II online/offline object monitoring program.
- Improved monitoring of the EMTiming system.
- Maintained and repaired the EMTiming system.
- Studied prospects for discovering large  $\tan\beta$  Supersymmetry using multi-tau final states.

CMS Collaboration, Texas A&M University

2005-2007

- Developed HCal trigger primitive emulation software.
- Developed HCal trigger data quality monitoring software.
- Developed tools for HCal trigger commissioning and validation (at CERN).

Phenomenology Activities, Texas A&M University

2004-2007

- Studied the prospects for discovering Supersymmetry in the co-annihilation region at the LHC using a multi-tau signature.
- Developed a method to indirectly measure  $M_{\tilde{\tau}} - M_{\tilde{\chi}_1^0}$  and  $M_{\tilde{g}}$ .

ATLAS Collaboration, University of Chicago

2002-2004

- Developed and tested optimal filtering algorithms for Tile Calorimeter energy measurements.

CDF Collaboration, University of Chicago

2001-2002

- Developed a database tool in Python for calculating integrated luminosity for runs satisfying selected conditions.

## SELECTED PUBLICATIONS

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- Combined Analysis of  $\nu_\mu$  Disappearance and  $\nu_\mu \rightarrow \nu_e$  Appearance in MINOS Using Accelerator and Atmospheric Neutrinos  
MINOS Collaboration, *Phys. Rev. Lett.* **112**, 191801 (2014)
- Signature-based Search for Delayed Photons in Exclusive Photon Plus Missing Transverse Energy Events from  $p\bar{p}$  Collisions with  $\sqrt{s}=1.96$  TeV  
CDF Collaboration, *Phys. Rev. D* **88**, 031103(R) (2013)
- Search for Supersymmetry with Gauge-Mediated Breaking in Diphoton Events with Missing Transverse Energy at CDF II  
CDF Collaboration, *Phys. Rev. Lett.* **104**, 011801 (2010)
- Indirect Measurements of the  $\tilde{\tau} - \tilde{\chi}_1^0$  Mass Difference and  $M_{\tilde{g}}$  in the Co-annihilation Region of MSUGRA Models at the LHC



R. Arnowitt, A. Aurisano, B. Dutta, T. Kamon, N. Kolev, D. Toback, P. Simeon and P. Wagner,  
*Phys. Lett. B* **649**, 73 (2007)

## TALKS

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- The NO $\nu$ A Simulation Chain  
International Conference on Computing in High Energy and Nuclear Physics (CHEP)  
Okinawa Institute of Science and Technology, Okinawa, Japan (2015)
- The NO $\nu$ A Experiment  
Invited talk, International Workshop on Next generation Nucleon Decay and Neutrino Detectors (NNN)  
APC Laboratory, Paris, France (2014)
- MINOS Search for Sterile Neutrinos  
Meeting of the American Physical Society Division of Particles and Fields (DPF)  
University of California, Santa Cruz, Santa Cruz, California (2013)
- Search for New Physics in the Exclusive  $\gamma + \cancel{E}_T$  Final State at CDF  
High Energy Physics/Astro Seminar  
University of Cincinnati, Cincinnati, Ohio (2012)
- Searches for New Physics at CDF  
International Conference on High Energy Physics (ICHEP)  
Melbourne, Australia (2012)
- Search for New Physics in the Exclusive  $\gamma + \cancel{E}_T$  Final State  
LEPP Journal Club Seminar  
Cornell University, Ithaca, New York (2012)
- Signals in the Co-annihilation Region of Supersymmetry at the LHC  
April Meeting of the American Physical Society  
Dallas, Texas (2006)
- Signals in the Co-annihilation Region of Supersymmetry at the LHC - Supersymmetry and Dark Matter  
Texas Section of the American Physical Society  
Waco, Texas (2004)

## AWARDS

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| • Honor Society of Phi Kappa Phi                         | 2009                  |
| • Texas Section of the APS Presentation Award - Graduate | 2004                  |
| • Texas A&M University Graduate Merit Fellowship         | Aug. 2004 - July 2005 |

## TECHNICAL EXPERTISE

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- Languages known: C++ (expert), Python,  $\text{\LaTeX}$ , and Bash
- Expertise using ROOT and PyROOT, and familiarity using RooFit .



- Familiarity with Linux and Unix administration.
- Experience building fit frameworks using the MINUIT2 suite.
- Experience with Google performance tools and the valgrind family of tools, particularly Memcheck and Callgrind.

## **TEACHING EXPERIENCE**

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*Texas A&M University*

Fall 2005-Spring 2006

- Teaching Assistant for classical mechanics and electromagnetism with calculus for engineers. Duties included running a recitation section, a laboratory section, and proctoring and grading exams.